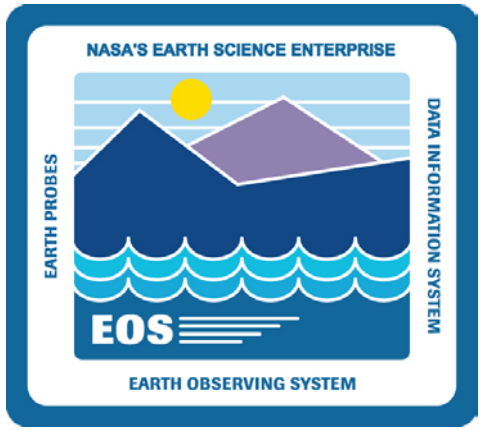


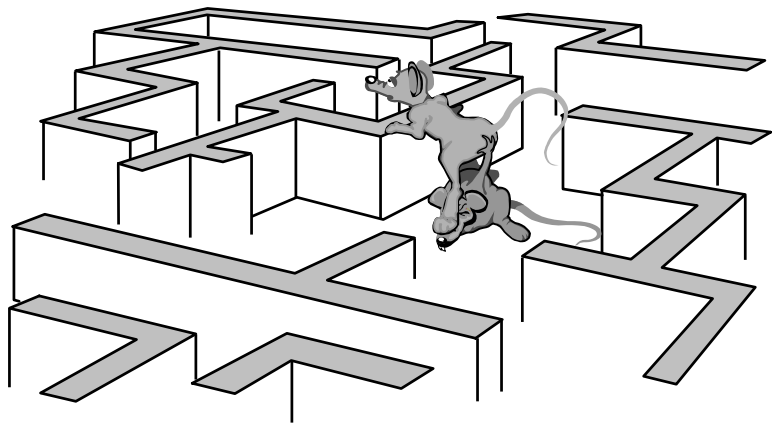
CONFIGURATION MANAGEMENT

ECS Training

625-CD-612-003

Overview of Lesson

- Introduction
- Configuration Management Topics
  - M&O role in CM activities
  - Configuration Control Boards (CCBs)
  - Configuration Change Request (CCR) Process
  - Software Change Process
  - Hardware Change Process
  - Baseline Change Process
- Practical Exercise



Objectives

- **Overall: Proficiency in ECS Configuration Management**
  - **Describe M&O role in CM activities**
  - **List Configuration Control Boards (CCBs), roles, and responsibilities**
  - **Process a Configuration Change Request (CCR)**
  - **Prepare a request for impact analysis**
  - **Process a software change**
  - **Review Configuration Parameters in Configuration Registry**
  - **Access baseline information**

Importance

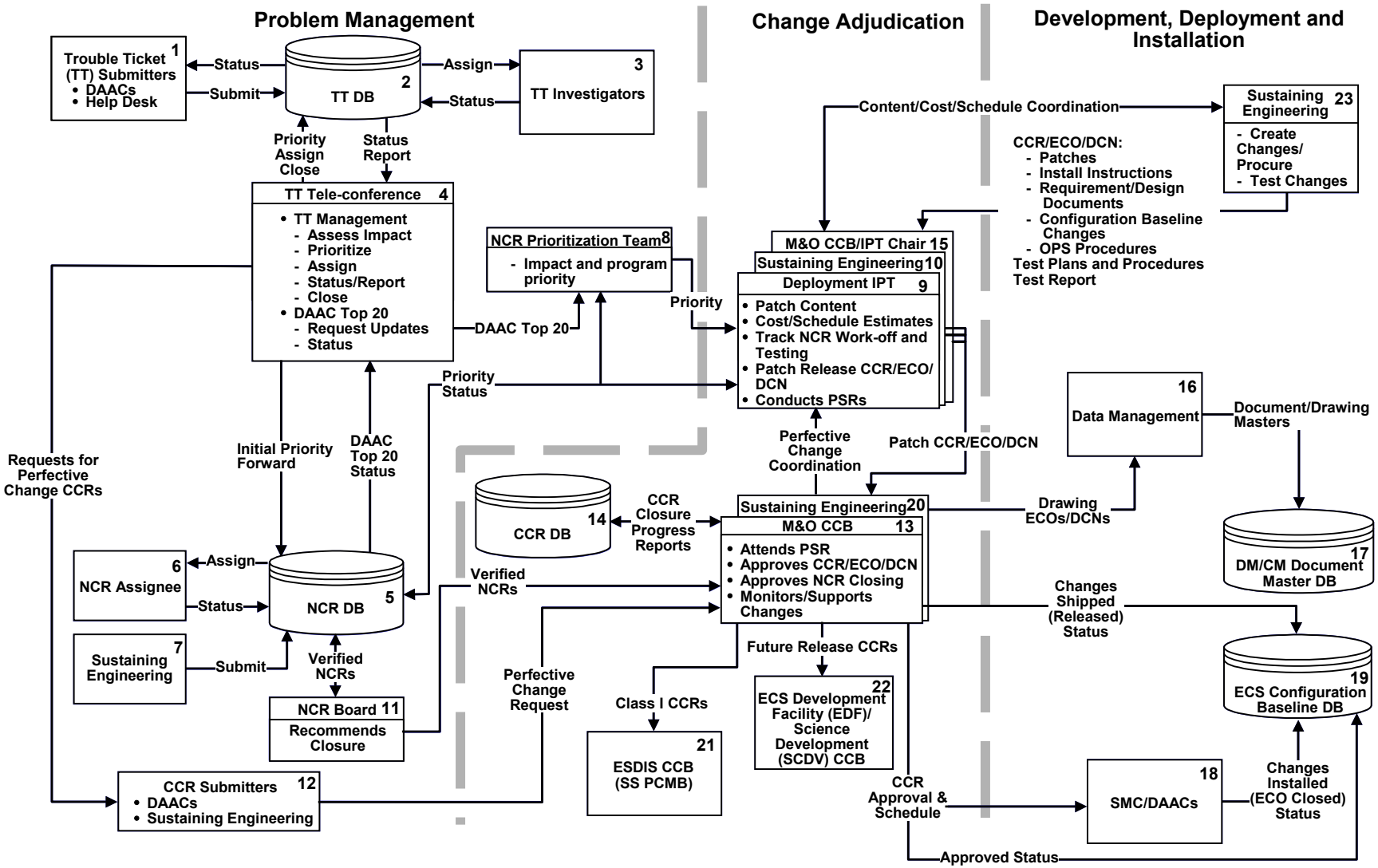
Lesson provides preparation for several roles to ensure effective CM for implementation of system changes

- **CM Administrators**
- **System Engineers, System Test Engineers, Maintenance Engineers**

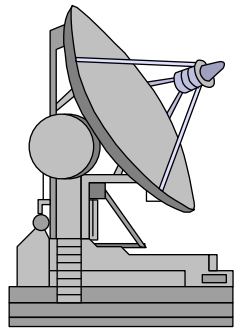
M&O Role and CM Activities

- DAAC Maintenance and Operations CM activities
  - After acceptance of ECS
  - Administrative and technical support of change control
  - Documentation and coordination of changes to site hardware, software, and procedures
  - Configuration identification
    - Maintenance and control of technical documentation
  - Configuration status accounting
    - Recording and reporting information about the configuration status of ECS documentation, hardware, and software
    - BLM reports
  - Configuration audits
    - M&O supports internal and ESDIS assessments of project compliance with relevant CM plans

M&O Role: Change Management



M&O Role: Science Software CM

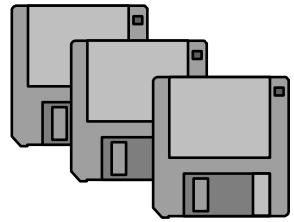


- **Science Software CM**
  - **developed at Science Computing Facilities**
  - **upon delivery to DAAC, enters custody of DAAC CMO**
  - **SSI & T: DAAC management and I &T team**
  - **M&O role**
    - **support during I & T**
    - **support DAAC Manager after acceptance**
    - **if Science Software has inter-DAAC dependencies, support coordination with affected DAACs**
    - **ensure any necessary coordination with ESDIS prior to moving Science Software into production operations**

System Operations Support

- **SOS -- System Operations Support**
  - **liaison between sites and ESDIS CCB**
  - **liaison between operations and the Sustaining Engineering Organization (SEO)**
  - **coordination of CM functions**
  - **maintenance of Change Request Manager (DDTS)**
  - **oversight for dissemination of controlled items to sites**
  - **monitoring of installed configurations of hardware and software for conformance to approved baselines**
  - **M&O ensures coordination and availability of needed data for change management**

M&O Role: Maintenance of the M&O Libraries



- **Maintenance of M&O Documentation and Software Library**
  - **both common and site-specific software**
  - **site personnel responsible for CM associated with on-site library**

M&O Role: Library Administration

- Soft or hard copy maintained in library
- Three ECS functions administer ECS libraries
  - Data Management Organization (DMO) manages EDHS
  - CM manages ECS Baseline Information System (EBIS)
  - SMC manages software deliveries, distribution of non-contractual documentation, and maintenance of copies of software deliverables
- CM at the ECS Development Facility maintains a database for library holdings and index
- Baseline Manager tool for documents that are under baseline CM control
- Sites manage libraries and related CM activities for software not developed by ECS
  - Science software
  - DAAC-Unique Extensions (DUEs)

Baseline Control

- **Baseline control milestones during maintenance and operations**
  - **Installation Plan (IP): COTS hardware configuration**
  - **Consent to Ship Review (CSR): hardware and software configuration and plans for host sites; a Pre-Ship Review (PSR) may determine readiness for delivery**
  - **Release Readiness Review (RRR): documents state of configuration items at each host site**
  - **Operational Readiness Review (ORR): documents flight-certified, ESDIS-approved, fully integrated EGS**
- **Site authority**
  - **ESDIS - authority over changes to common software**
  - **site CCB - authority over site-specific Class II changes**
  - **site-specific parameters for COTS software**
  - **specific configuration of tools and utilities, as delegated by ESDIS**

Configuration Identification

- **Establishes unique identifiers for ECS control items: Hardware, Software, Databases, Documentation**
- **ECS System Baseline Specification identifies Configuration Items (CIs)**
  - **Defines configuration baseline data structure and data schema**
  - **Delineates how items will be named, described, versioned, and controlled**
  - **Defines the item's associated engineering specifications and location of the actual controlled baseline data (including the ECS Configuration Baseline database)**
- **Configuration Baseline may change with a new System Release or with a patch**

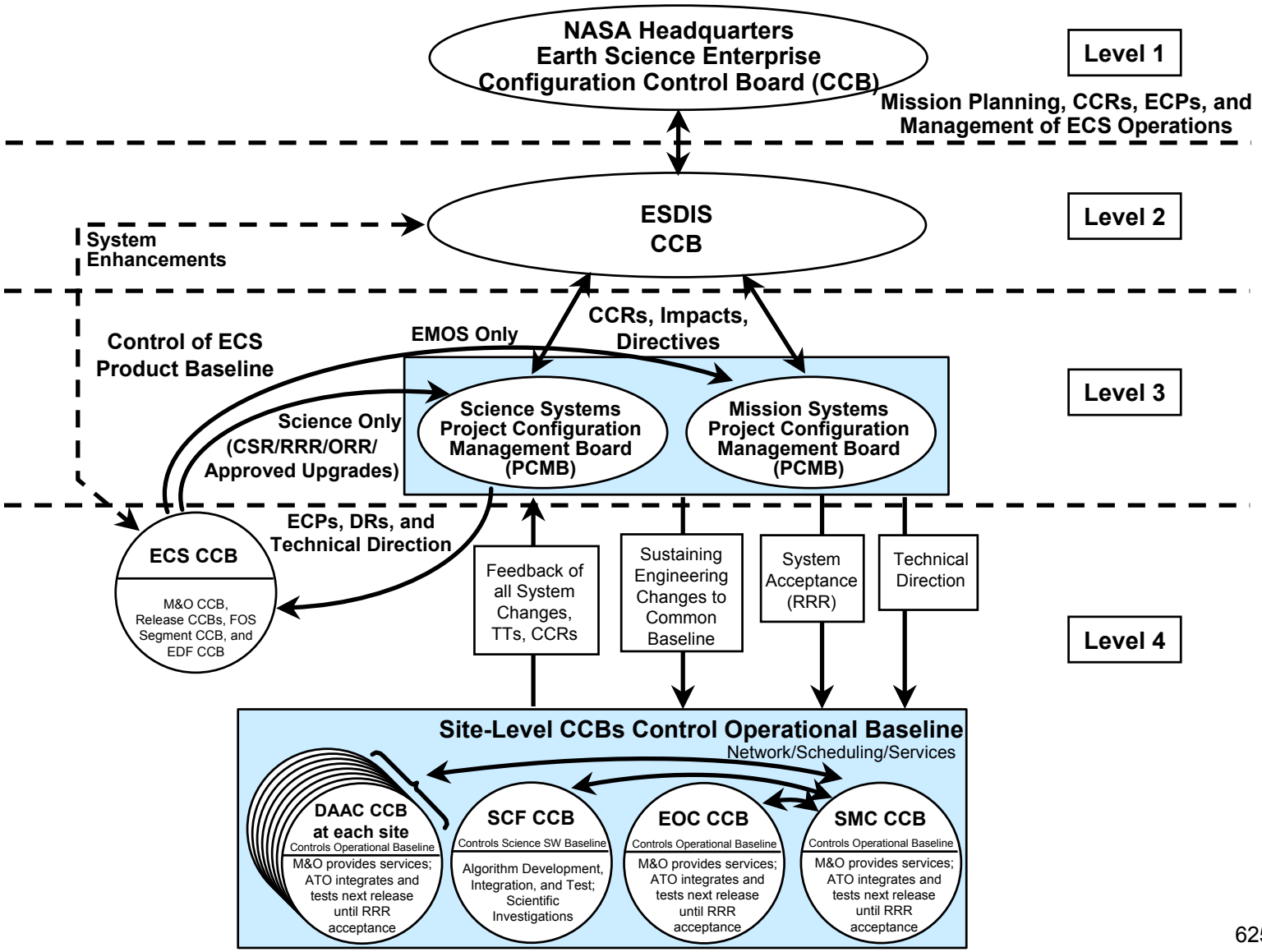
Configuration Status Accounting

- **Reports, metrics, records to support configura-tion management with status tracking information**
  - **identification and resolution of configuration problems (e.g., Trouble Ticket, NCR listings, progress reports)**
  - **M&O CCB review/approval of baseline changes (e.g., CCR listings,progress reports, CCB agendas, minutes)**
  - **monitoring progress for change implementation (e.g., ECO/DCN status reports, IPT Drop Matrix listings)**
  - **maintenance of ECS Configuration Baseline status (e.g. Approved/Shipped Changes, Installed Changes)**
  - **Verification and auditing of baselines (e.g. discrepancy metrics/reports reflecting differences between the approved and installed baselines in both the testing environment in the Verification and Acceptance Test Center [VATC] or Performance Verification Center [PVC] and at the DAACs)**

Configuration Audits

- Conducted by ECS CMO, supported by site CM
- Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA) validate that:
  - as built configuration compares with the approved baseline
  - test results verify that each ECS product meets its specified performance requirements to the extent determinable by testing
  - the as-built configuration being shipped compares with the final configuration tested in the VATC
- Differences between the audited configuration and the final tested configuration are documented
- Automated scripts compare DAAC configurations to baseline documentation

CCB Hierarchy



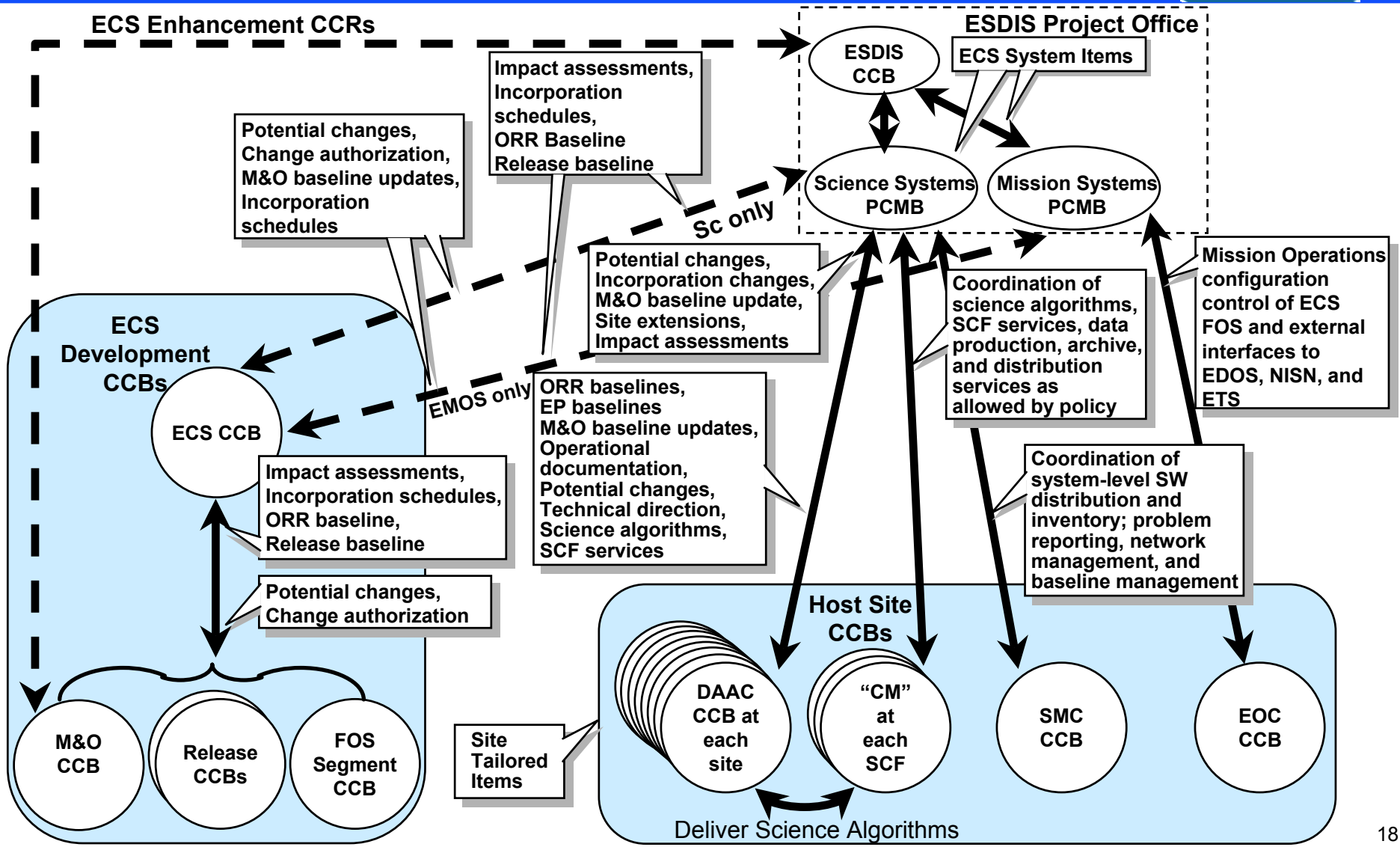
CM Responsibilities

- **ESDIS Management**
  - **establishes ECS CM policies**
- **CCBs**
  - **classify, prioritize, evaluate, recommend, and approve (within their authority) changes to baselines**
- **CM Administrators (at SMC, EOC, DAACs, SCFs)**
  - **establish and maintain CM records**
  - **facilitate the configuration change request (CCR) process**
  - **monitor and report status of proposed and approved CM actions**
  - **support their respective CCB (as required)**

CM Responsibilities (continued)

- **Sustaining Engineering Organization (SEO) --**
  - **assesses feasibility and cost, schedule and performance impacts of proposed system-wide changes**
  - **implements such changes when directed by ESDIS**
- **DAAC Sustaining Engineers --**
  - **assess DAAC impacts of system-wide proposed changes**
  - **develop and maintain ESDIS-approved DAAC-specific modifications to ECS products**
- **Maintenance Engineers --**
  - **maintain ECS HW and report configuration changes resulting from maintenance actions**

Operational CCB Relationships



Science Software and Change Control

- Science Computing Facility (SCF) performs configuration control
  - Software and Databases to be executed at another site
  - SCF resources that are made available to EOSDIS community
- ECS M&O function directed by DAAC CCB
  - Accepts science software and data from the SCF
  - Provides services to support EOC control of the EOC operational baseline
- Central coordination by Project Control Manage-ment Board
  - ECS integrity and quality of service
  - Coordination with internal and external networks, systems, facilities
  - ESDIS CCB visibility into ECS operations
  - Convenient user administrative services

Configuration Change Requests (CCRs)

- **No undocumented changes**
  - **all requests for change documented using CCR form**
  - **CCR generated against the baseline affected by the proposed change**
  - **Form can be completed electronically**
    - **Word processing form**
    - **Change Request Manager tool (CM Administrator)**
- **CCB review**
  - **CCR submitted to appropriate CCB**
  - **CCR form may also be a cover sheet for a request to CCB for a deviation or waiver from baseline**

ECS CCR Form

Earth Observing System Data and Information System (EOSDIS)
Core System (ECS)
Configuration Change Request (CCR)

1. Configuration Change Board (CCB)
ESDIS:___ ECS:___ SMC:___ DAAC: GSFC___, LaRC ___,
ASF___, EDC___, JPL___, NSIDC___, ORNL___ EOC:___

2. CCR No.

3. Submitted Date:	4. Revision	5. Priority Emergency ☐ Urgent ☐ Routine ☐	6. Change Class	7. Status

8. CCR Title:

9. Originator: Org: e-mail: phone:

10. Approval:_____ _____
signature date

11. Reason for Change

(indicate attachment ___)

12. Description of Change

(indicate attachment ___)

13. Impact Analysis:
Cost: ☐ None ☐ Small ☐ Medium ☐ Large
(Not exceeding $100,000) ($100,000 to $500,000) (Over $500,000)
Evaluation Engineer: Org: e-mail: phone:
Impact Evaluators: ESDIS___; ECS Dev___; SEO___; SMC___; DAACs: GSFC___,
LaRC ___, ASF___, EDC___, JPL___, NSIDC___, ORNL___; EOC___;
Others_____
(indicate attachment ___)

14. Comments: (Indicate Sites/ Organizations Affected)

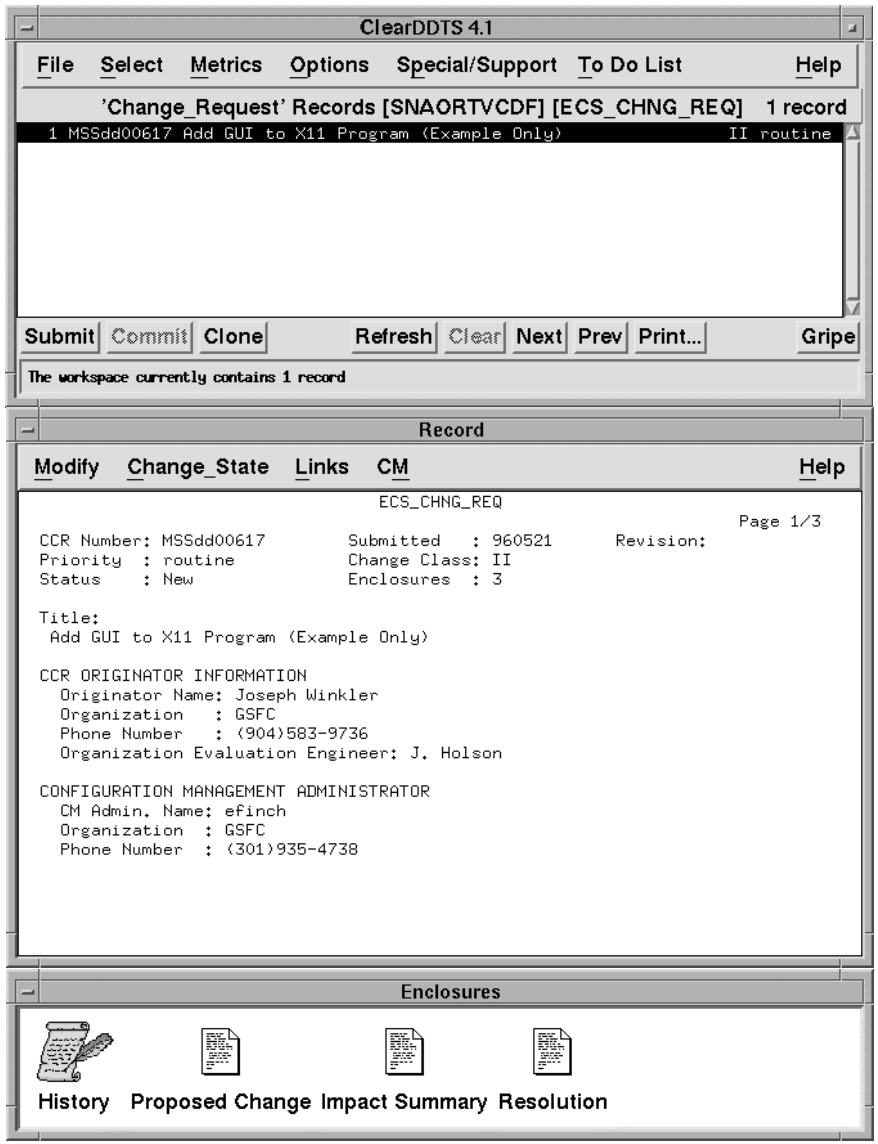
(indicate attachment ___)

15. Board Action: ☐ Approved ☐ Withdrawn ☐ Disapproved ☐ Deferred Until_____
date
Further Action Required: ☐ ECP ☐ Waiver ☐ Deviation ☐ Tech Direction ☐ Contract Mod
☐ DCN Other:_____

16. CCB Approval
Chair:_____ _____
signature date

17. CCR Implemented
CM Admin. signature:_____ date:____

Change Request Manager (DDTS)



Request for Impact Analysis

- **Support of ESDIS CCB may require assessment of the impact of a proposed CCR on local or system maintenance and operations**
- **Assessing the impact of CCRs with significant system implications and/or potential system-wide application may require the assistance of the ECS development organization**
- **Formal request for impact assessment according to Mission Operation Procedures for the ECS Project (611-CD-610-001)**
- **Impact assessments consolidated into a CCR Impact Summary**

CCR Impact Analysis Form

CCR Impact Analysis

Responder Request Number: ____
Responder:_____
Responder Point of Contract:
address:_____
_____
phone:_____
e-mail:_____
CCB Schedule Date:_____
CCR Number:_____
CCR Log Date:_____
CCR Originator:_____
CCR Originator Point of Contract:
address:_____
_____
phone:_____
e-mail:_____

Evaluation Engineer: _____
Evaluation Engineer Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
Requested Return Date:_____

Rough Order of Magnitude (ROM) Impact Analysis

Basis of Estimate:

Technical Assumptions and Comments:

Cost Impact:
None [ ]
Small [ ] < $100,000
Medium [ ] $100,000 < x < $500,000
Large [ ] > $500,000

Schedule Impact:

Technical Assessment: (Your impact analysis should consider the implementation approach; interfaces affected; HW or SW changes required; documentation changes required -- change from/to pages; suggested alternatives, if any; and impact to security features. If your system is not impacted, please provide that information to the CM Administrator.)

Comments:

Signed:_____
(Responder)
Date:_____

CCR Impact Summary

CCR Impact Summary

Evaluation Engineer: _____
Evaluation Engineer Point of Contact:
address:_____
_____
phone:_____
e-mail:_____
CCR Board Date:_____

Resources Summarized:

Technical Summary:

ROM Summary (BOE, Cost, and Schedule):

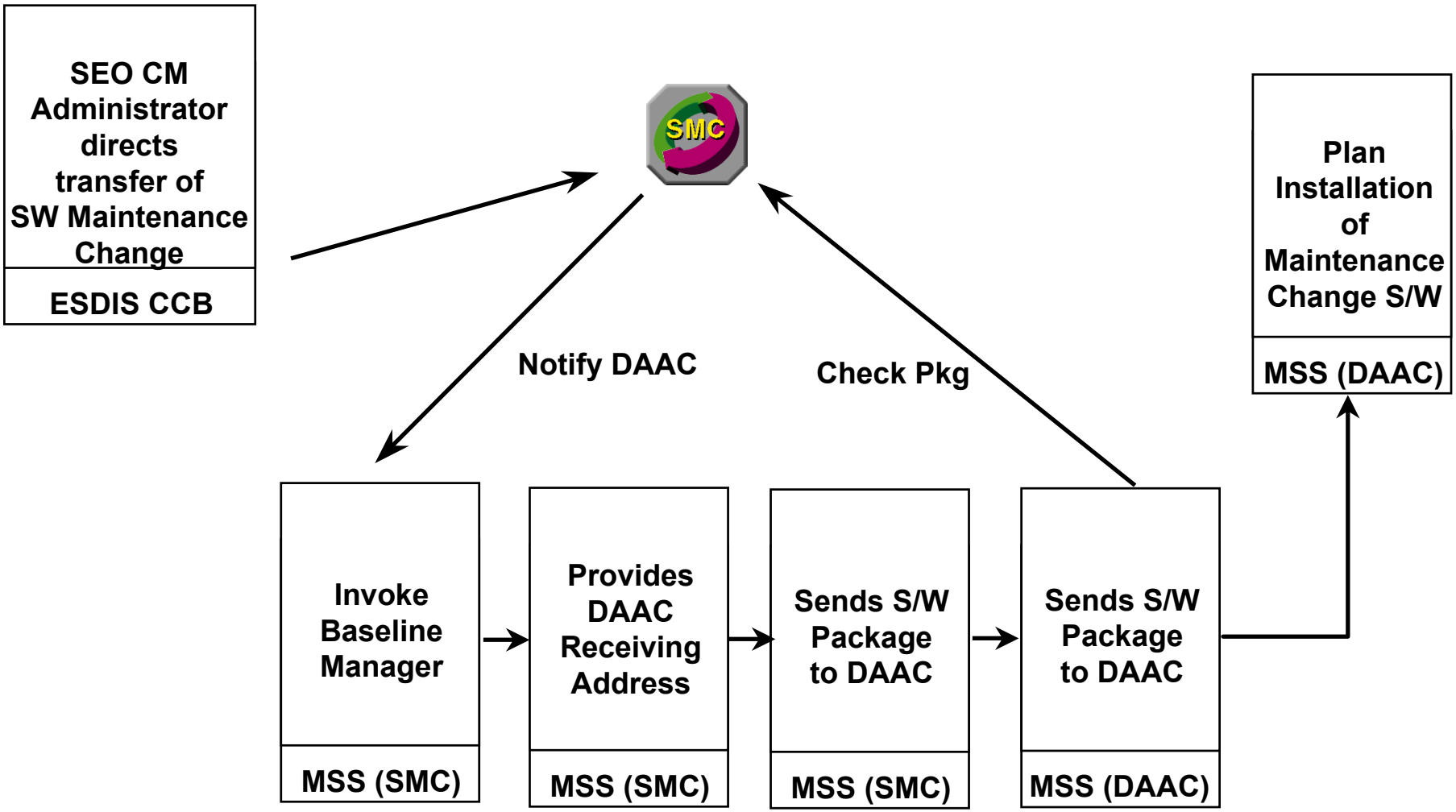
Recommendation:

Signed:_____
(Evaluator)
Date:_____

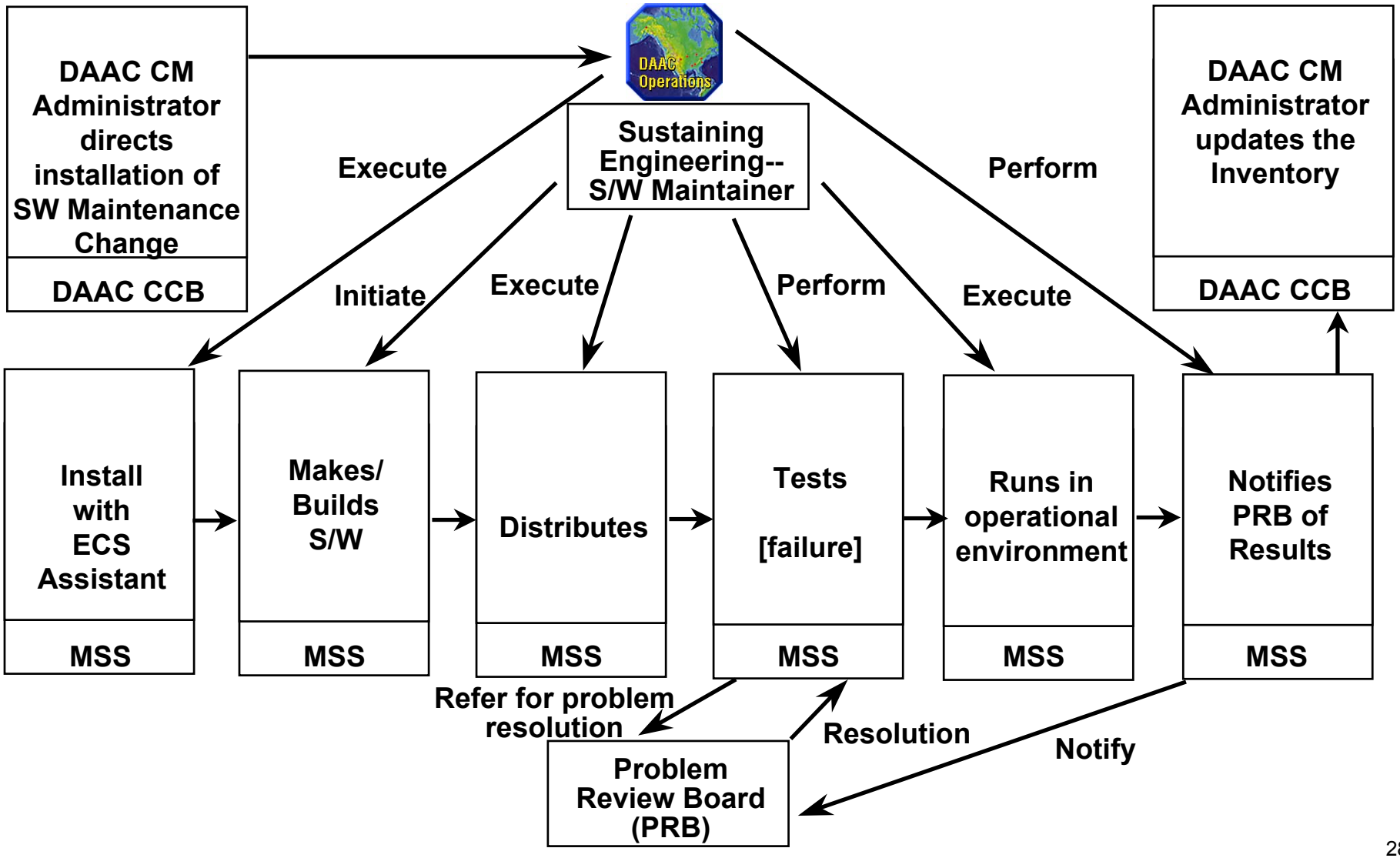
Software Baselines and Changes

- **Software release is through ESDIS SMC or, with ESDIS permission, directly to the sites**
  - **Version Description Document (VDD) provides summary documentation package**
  - **ECS Project CMO assembles and packages the delivery**
- **Change Scenarios**
  - **COTS software problem**
  - **custom software problem**
  - **science software upgrade**
  - **COTS software upgrade**
  - **system enhancement**

Software Transfer & Installation: Transfer Functional Flow



Software Transfer & Installation: Installation Functional Flow



Software Transfer

- When software maintenance change package is ready and approved by ESDIS CCB, SEO CM Administrator requests SMC to distribute
- SMC CM Administrator promotes the change to the Operational Baseline and updates the Baseline Record and Inventory Record

Software Change Installation

- **Review/approval by ESDIS precedes systematic installation**
  - **VDD final updates for system and center-specific material; final VDD is published**
  - **Installation of the build and operational and user documentation IAW installation schedule**
    - **ECS Assistant for installation**
    - **Scripts for System Administrator to do installation**
  - **Controlled document updates provided to SEO Document Maintenance and entered into CM**
  - **CM system updated to reflect M&O and center-specific baselines**

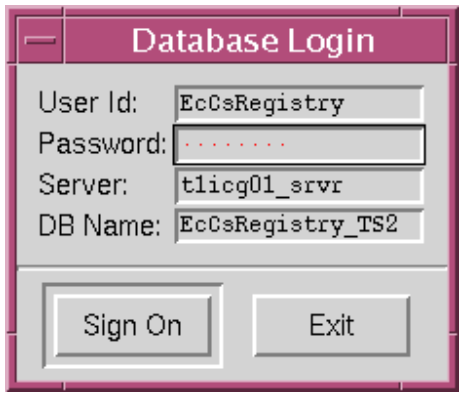
Software Change Installation (Cont.)

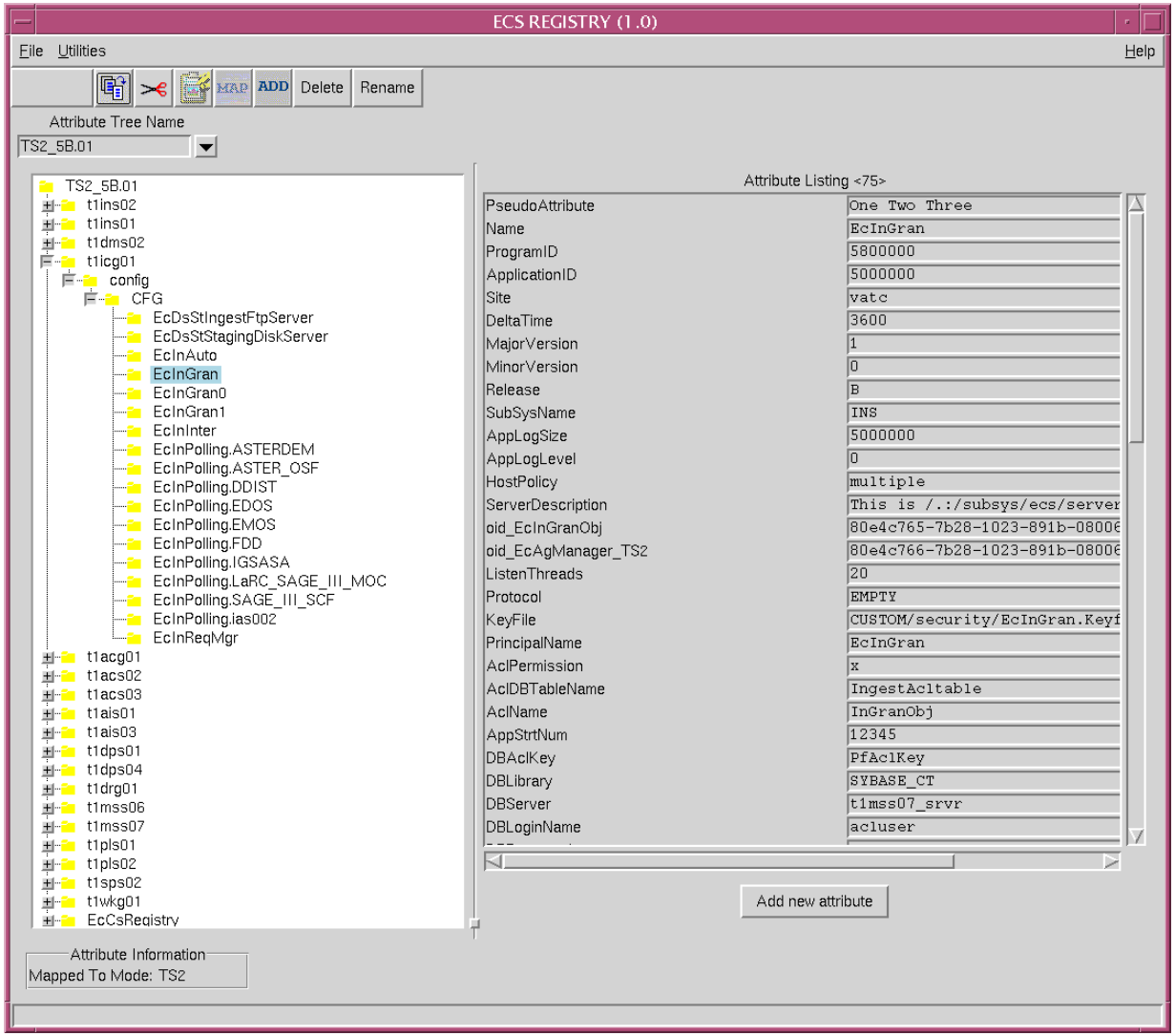
- **Implementation and test of software by DAAC Software Maintenance Engineer**
  - **Tests individual packages (unit, subsystem, system)**
  - **Runs full final software in operational environment**
  - **Notifies SMC of results**
- **DAAC CM Administrator updates site inventory record using Inventory/Logistical Management (ILM) tool**

Configuration Parameters

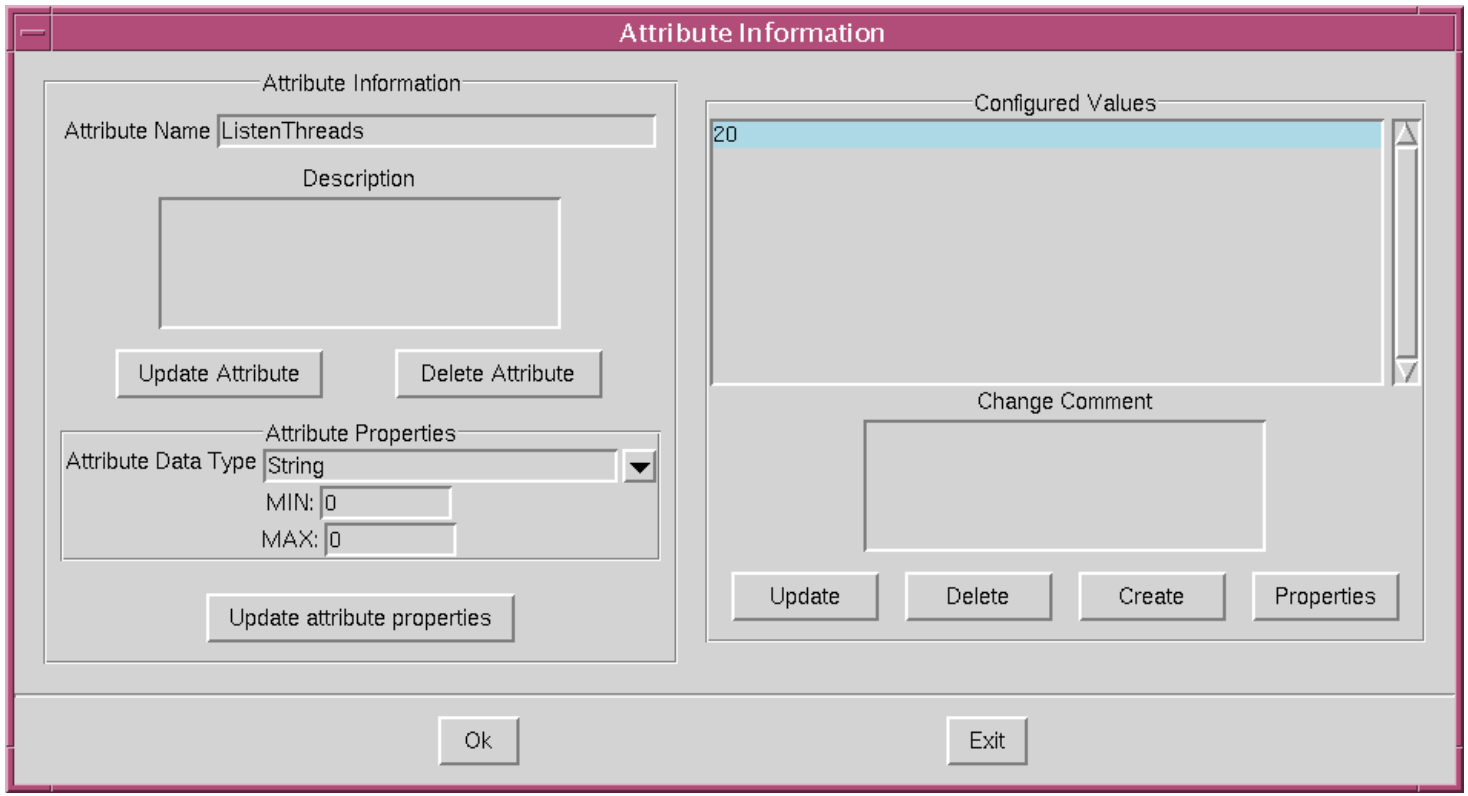
- Default settings may or may not be optimal for local operations
- Changing parameter settings
  - May require coordination among Configuration Management Administrator, Database Administrator, and Operations personnel
  - Some parameters accessible on GUIs
  - Some parameters changed by editing configuration files
  - Some parameters stored in databases
- Configuration Registry
  - Script loads values from configuration files
  - GUI for display and modification of parameters
  - Move (re-name) configuration files so ECS servers obtain needed parameters from Registry Server when starting

Configuration Registry





Configuration Registry (Cont.)



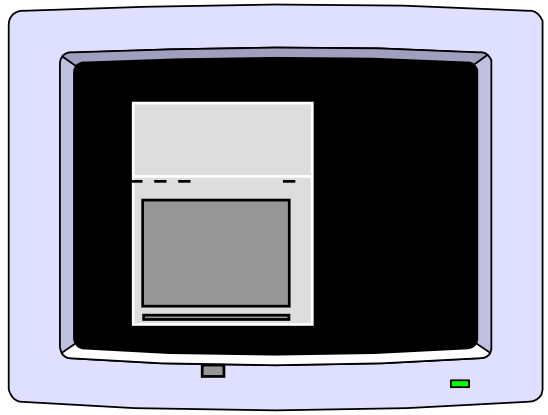
Hardware Baselines and Changes

- **Hardware baseline established at Release Readiness Review (RRR) following formal Physical Configuration Audit (PCA) and Functional Configuration Audit (FCA)**
  - **ESDIS approves establishment of operations baseline**
  - **Configuration baseline recorded in Engineering Release Record**
  - **M&O conducts testing of builds to ensure proper implementation of CCRs with no defects introduced**
- **Change Scenarios**
  - **COTS hardware problem repair that requires a CCR**
  - **System enhancement**

Hardware Change Installation

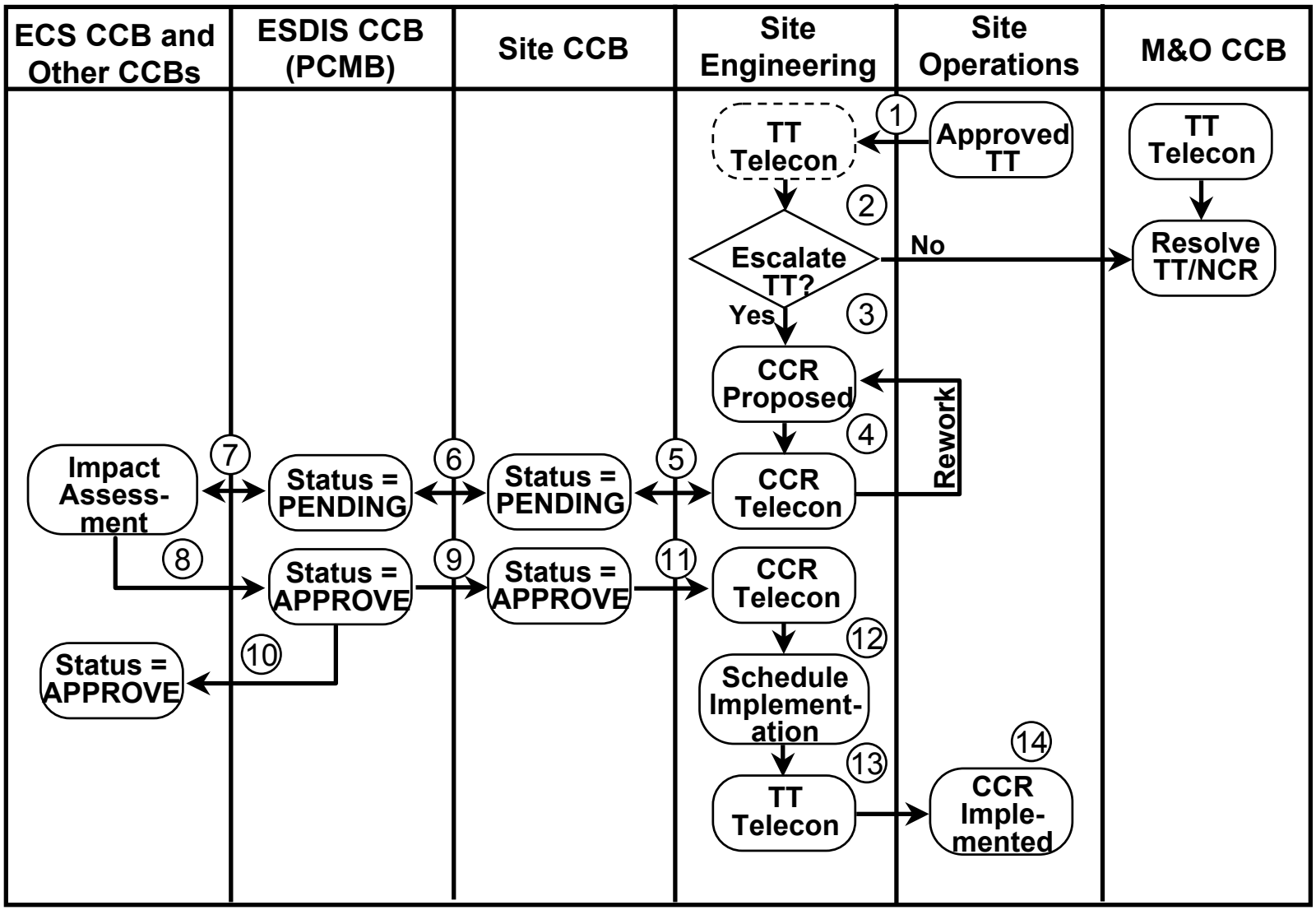
- **Repair with part of same make, model, version does *not* require CCR**
- **Change in make, model, version of a part to be used for repair, e.g., in an emergency, necessitates CCR to document the change**
  - **Review/approval by site CCB**
  - **Review by SEO/ESDIS for impacts/applicability to other sites**
  - **Provision of controlled document updates to SEO Document Maintenance and entry into CM**
  - **CM system updates to reflect change**
  - **Audits (FCA/PCA)**

Changes to the Baseline



- CM Tools for baseline changes
  - Change Request Manager: DDTS
  - Baseline Manager (BLM): Clearcase
  - Inventory/Logistical Maintenance (ILM) Manager: Remedy
- Related tools
  - From Management Subfunction software
    - Trouble Ticket System (TTS)
    - Problem reporting and tracking
    - Used by users, operators, system administrators

CCR Approval Flow



Baseline Terms and Concepts

- ***Baseline Management*** **is to identify and control baselined versions of hardware and software, and maintain a complete history of baseline changes**
- ***Control Item*** **is any ECS item under version control by CM**
- ***Configuration Item (CI)*** **is an aggregation of hard-ware, firmware, software, or any discrete component or portion, which satisfies an end user function and is designated for configuration control**
- ***Baseline*** **is a configuration identification document or set of such documents formally designated by the Government at a specific time in the life cycle of a CI**
- ***Configured Article*** **is a control item reportable as part of the Configured Articles List (CAL)**

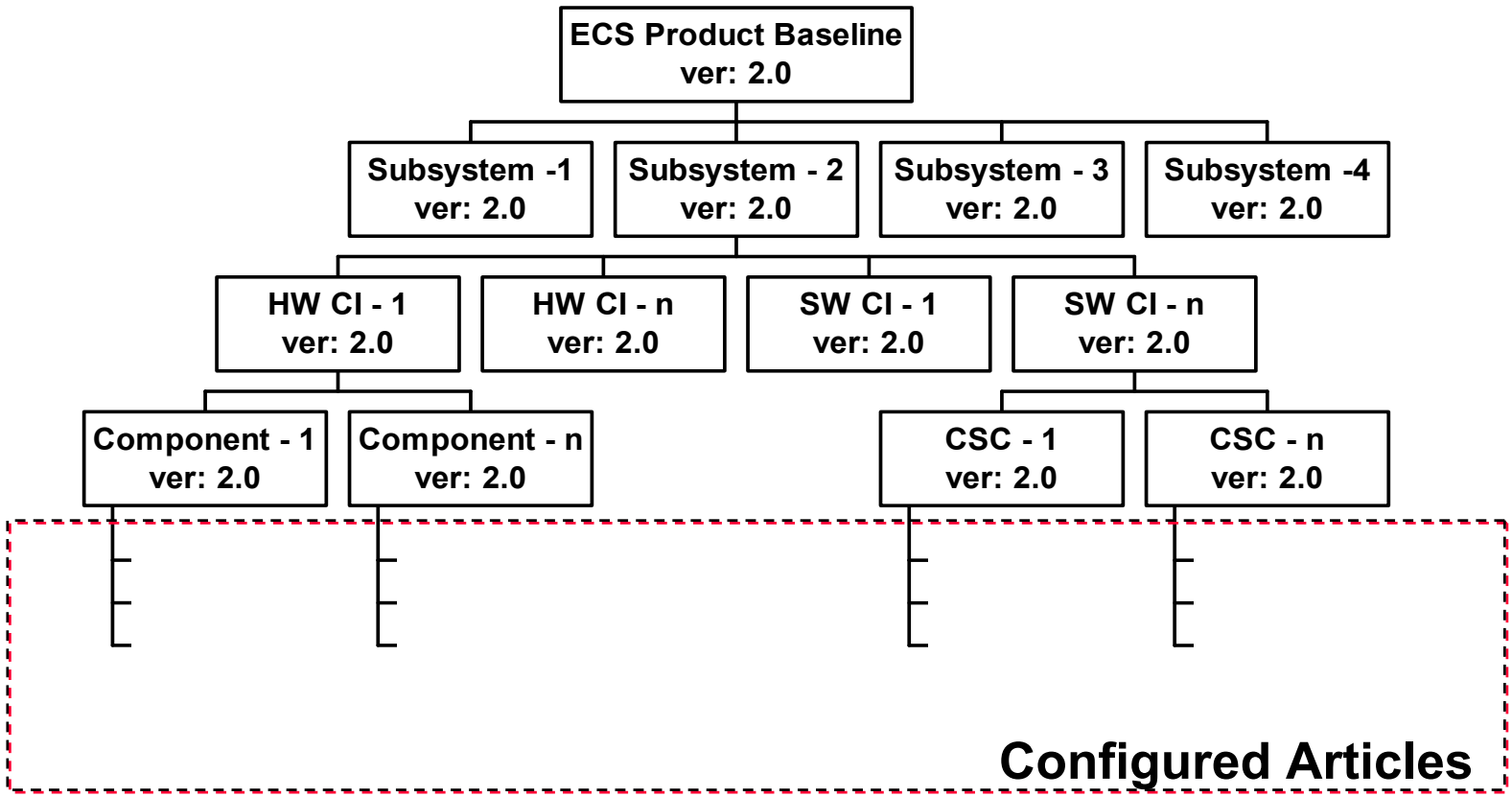
Baseline Terms and Concepts (Cont.)

- **ECS Structure and Baseline Terms**
  - ***Assembly***: **an item made up of other items**
    - ***Parent***: **a higher-level item (e.g., an assembly)**
    - ***Child***: **an item that is a component of a higher-level item**
  - ***Bill of Material***: **list of items that comprise an assembly**
  - ***Product Structure***: **the parent-child pairings that define the bill of material for an assembly; each product structure record specifies the effective dates and quantities for a single component of a parent for each engineering change**
  - ***Active Date***: **the date a component becomes effective in an assembly's bill of material**
  - ***Inactive Date***: **the date a component is no longer effective in an assembly's bill of material**

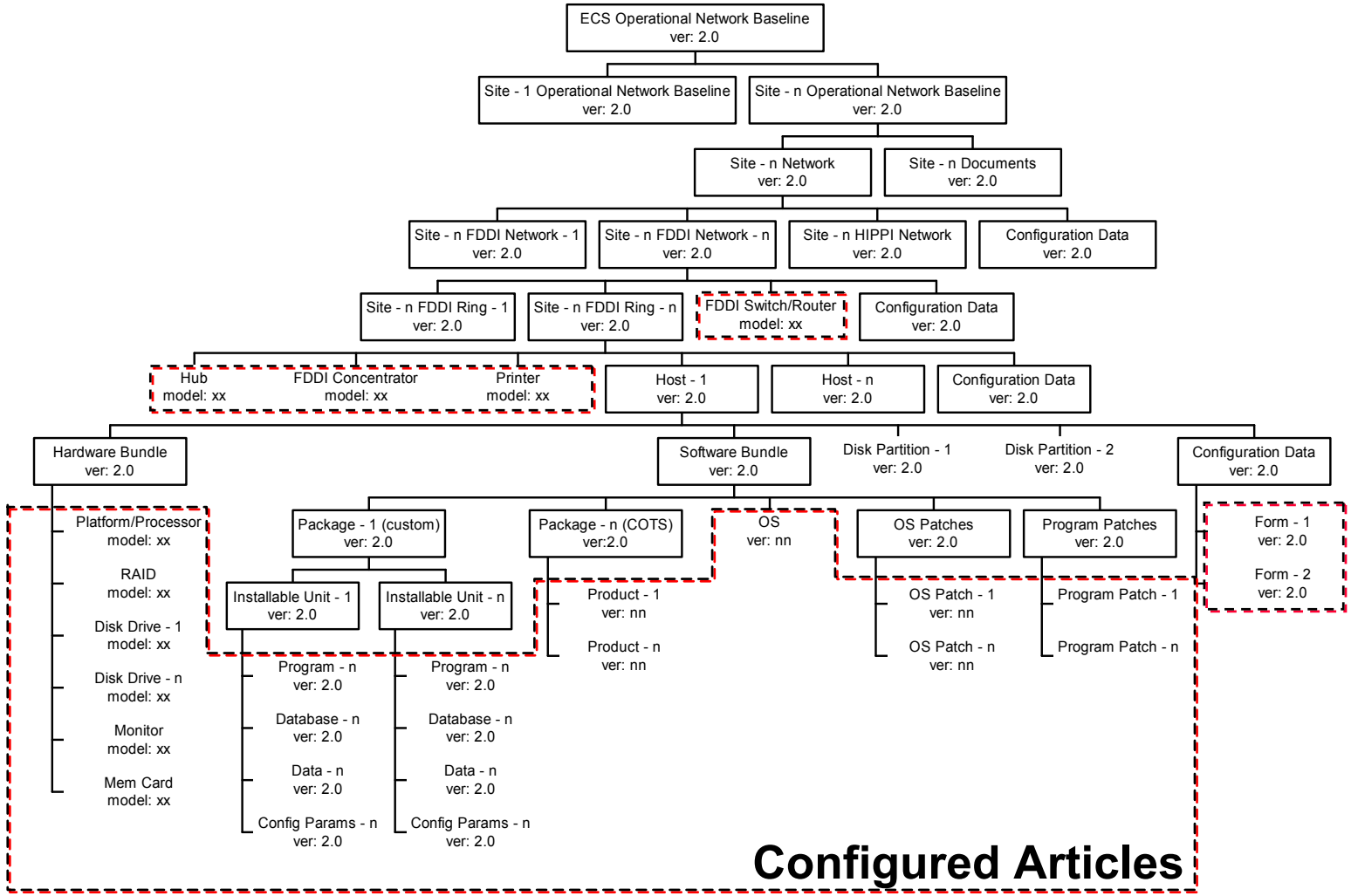
Baseline Terms and Concepts (Cont.)

- **ECS Structure and Baseline Terms (Cont.)**
  - ***Engineering Change***: **a mechanism for grouping, reporting, and controlling product changes collectively**
  - ***Revision***: **sequence number of a product structure change to an assembly; signifies a change to the configuration of an assembly that does not alter its form, fit, or function**
  - ***Implementation Status***: **a record describing the deploy-ment of a control item to a site and the current state and associated date of its implementation; each control item has one record for each site to which it is deployed**
  - ***Exporting Data***: **creating a formatted file or records extracted from the BLM database; control item engineer-ing change, product structure, and interdependency records may be extracted and sent to another BLM site via ftp**
  - ***Importing Data***: **loading BLM data from a formatted file**

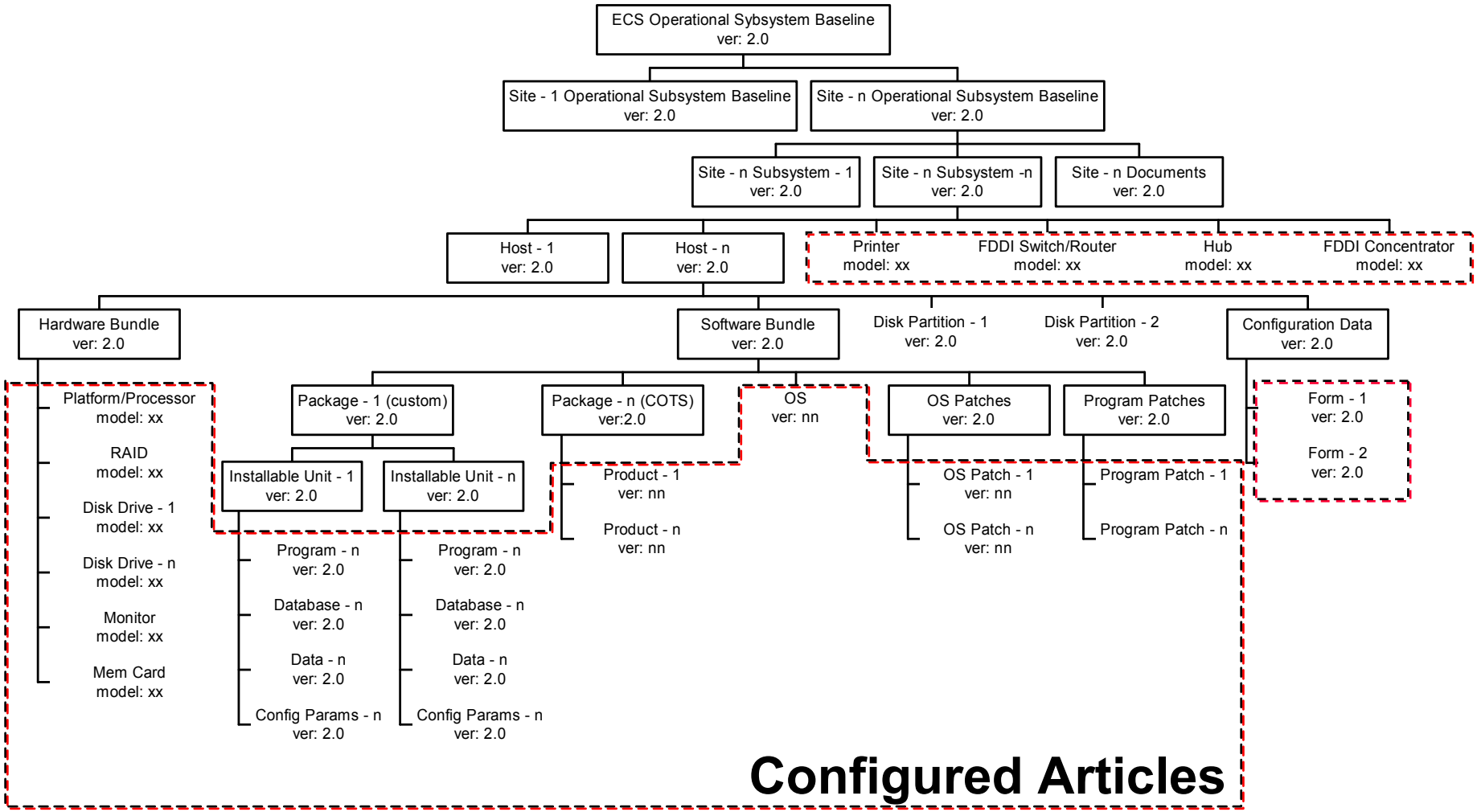
Product Structure - Design View



Product Structure - Operational (Network) View



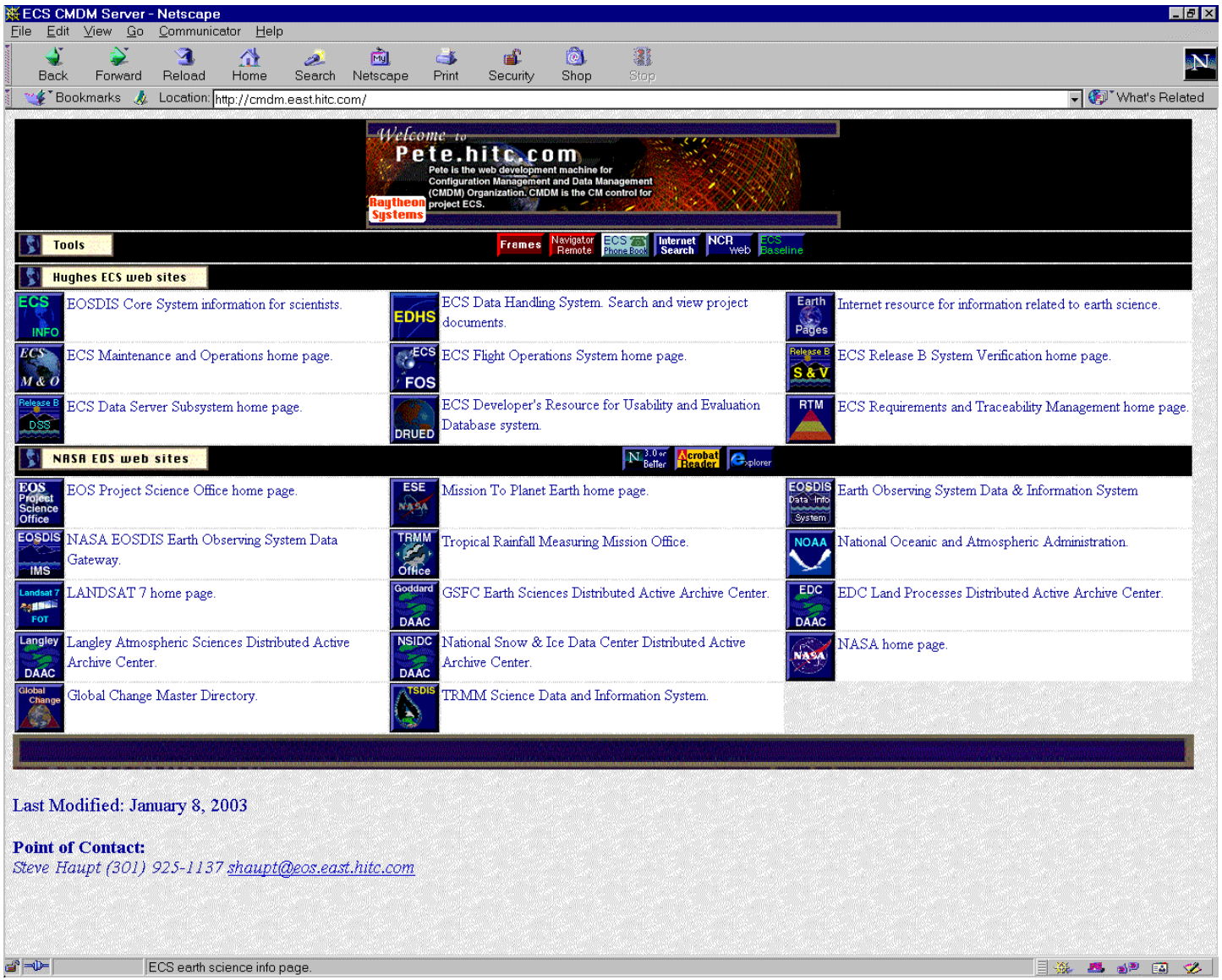
Product Structure - Operational (Subsystem) View



Baseline and Inventory Management: Tools

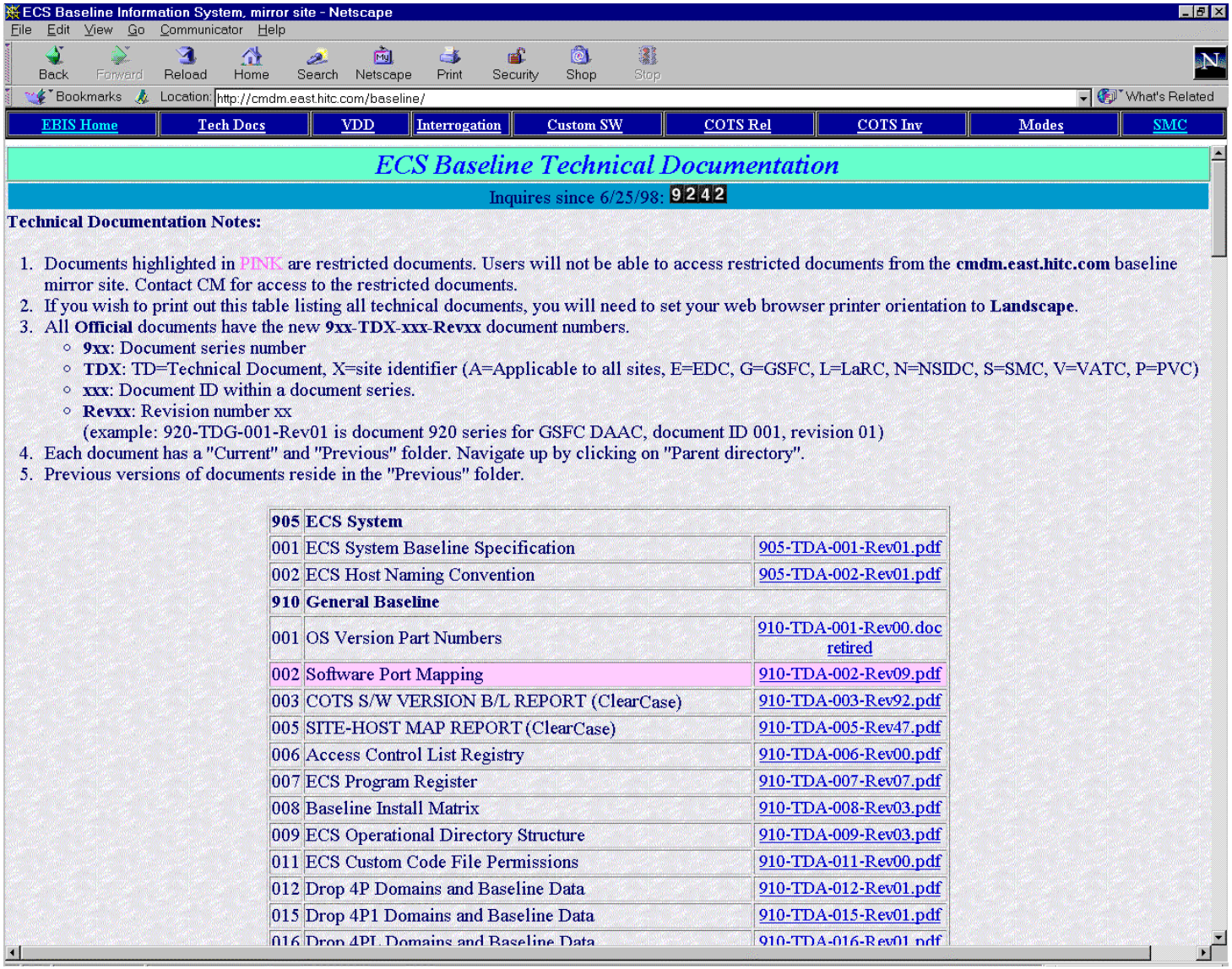
- **Baseline Management (BLM): ClearCase**
  - **Manages Baseline Records on software, scripts, GUIs**
  - **Maintained at ECS Development Facility (EDF)**
  - **Technical Document outputs posted to ECS Baseline Information System (EBIS) at http://cmdm.east.hitc.com, including 910 series affecting all sites and 920 series site-specific documents**
- **Inventory/Logistical Management (ILM): Remedy**
  - **Used at EDF to maintain property, repair, and software license data**
  - **Used at sites to create Maintenance Work Orders (MWOs) and record equipment maintenance activity**

ECS CMDM Server



ECS Baseline Information System (EBIS)

EBIS List of Technical Documents



ECS Baseline Technical Documentation

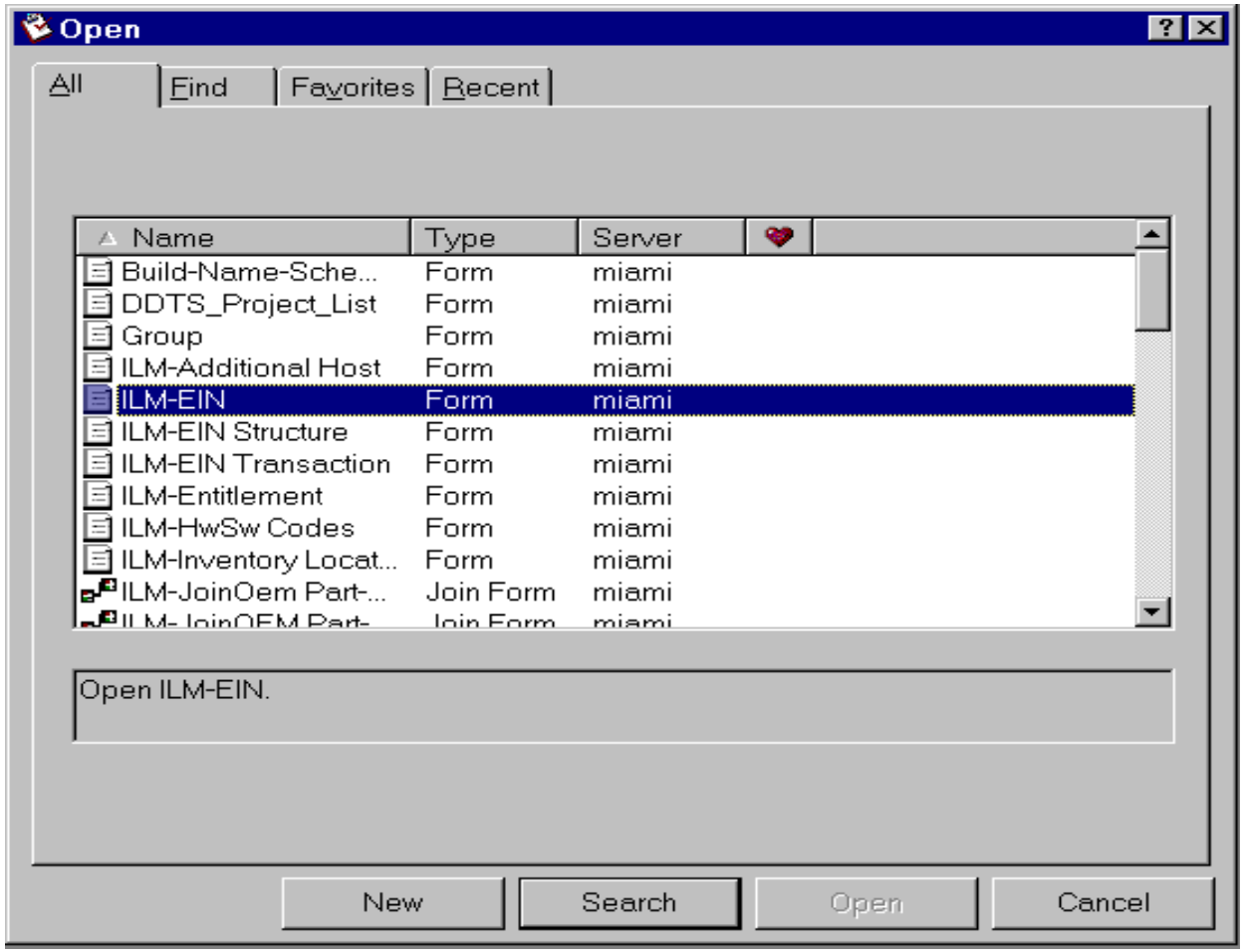
Inquires since 6/25/98: 9242

Technical Documentation Notes:

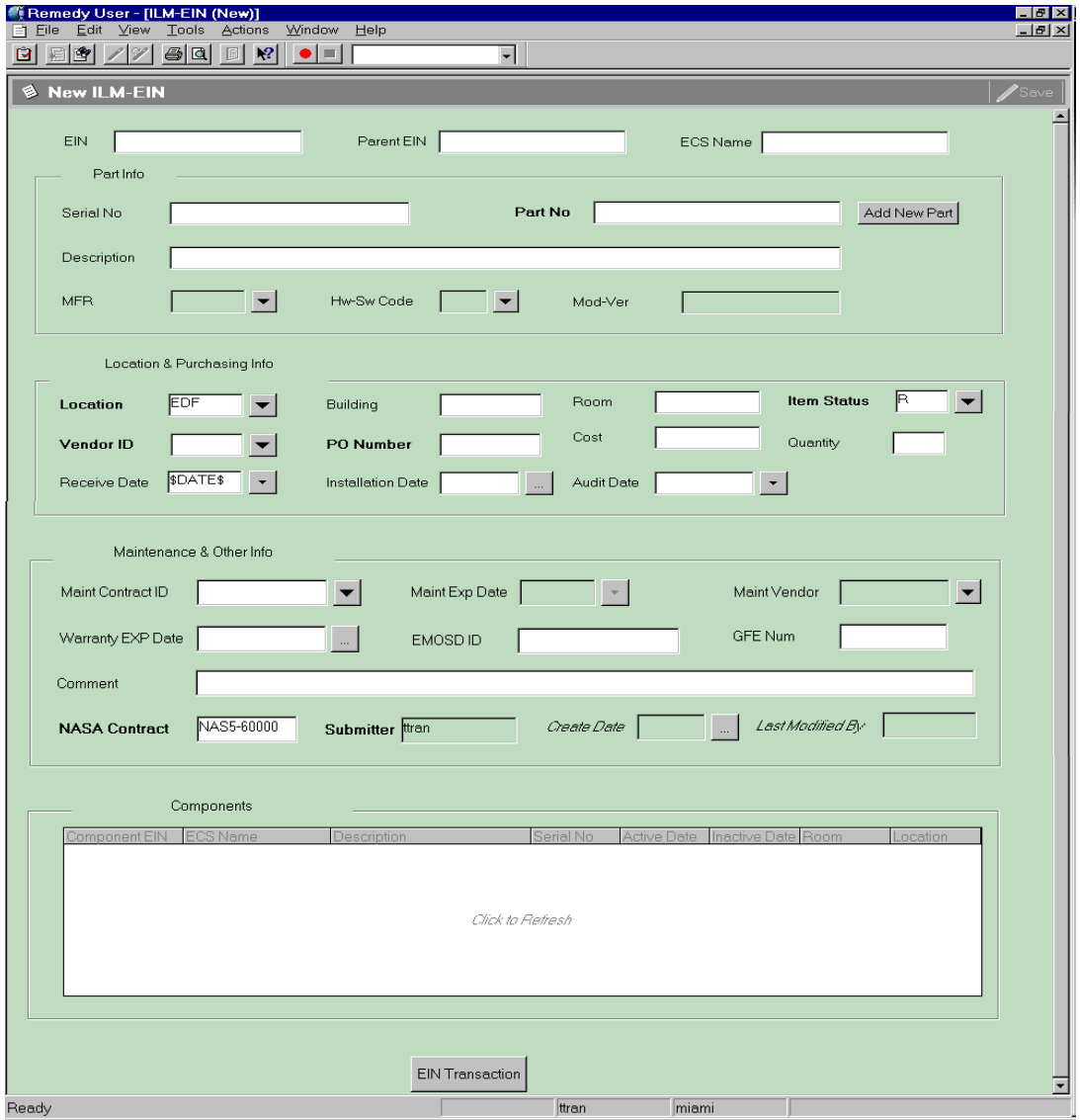
1. Documents highlighted in PINK are restricted documents. Users will not be able to access restricted documents from the **cmdm.east.hitc.com** baseline mirror site. Contact CM for access to the restricted documents.
2. If you wish to print out this table listing all technical documents, you will need to set your web browser printer orientation to **Landscape**.
3. All **Official** documents have the new **9xx-TDX-xxx-Revxx** document numbers.
   - **9xx**: Document series number
   - **TDX**: TD=Technical Document, X=site identifier (A=Applicable to all sites, E=EDC, G=GSFC, L=LaRC, N=NSIDC, S=SMC, V=VATC, P=PVC)
   - **xxx**: Document ID within a document series.
   - **Revxx**: Revision number xx
   (example: 920-TDG-001-Rev01 is document 920 series for GSFC DAAC, document ID 001, revision 01)
4. Each document has a "Current" and "Previous" folder. Navigate up by clicking on "Parent directory".
5. Previous versions of documents reside in the "Previous" folder.

905	**ECS System**	
001	ECS System Baseline Specification	905-TDA-001-Rev01.pdf
002	ECS Host Naming Convention	905-TDA-002-Rev01.pdf
910	**General Baseline**	
001	OS Version Part Numbers	910-TDA-001-Rev00.doc retired
002	Software Port Mapping	910-TDA-002-Rev09.pdf
003	COTS S/W VERSION B/L REPORT (ClearCase)	910-TDA-003-Rev92.pdf
005	SITE-HOST MAP REPORT (ClearCase)	910-TDA-005-Rev47.pdf
006	Access Control List Registry	910-TDA-006-Rev00.pdf
007	ECS Program Register	910-TDA-007-Rev07.pdf
008	Baseline Install Matrix	910-TDA-008-Rev03.pdf
009	ECS Operational Directory Structure	910-TDA-009-Rev03.pdf
011	ECS Custom Code File Permissions	910-TDA-011-Rev00.pdf
012	Drop 4P Domains and Baseline Data	910-TDA-012-Rev01.pdf
015	Drop 4P1 Domains and Baseline Data	910-TDA-015-Rev01.pdf
016	Drop 4P1 Domains and Baseline Data	910-TDA-016-Rev01.pdf

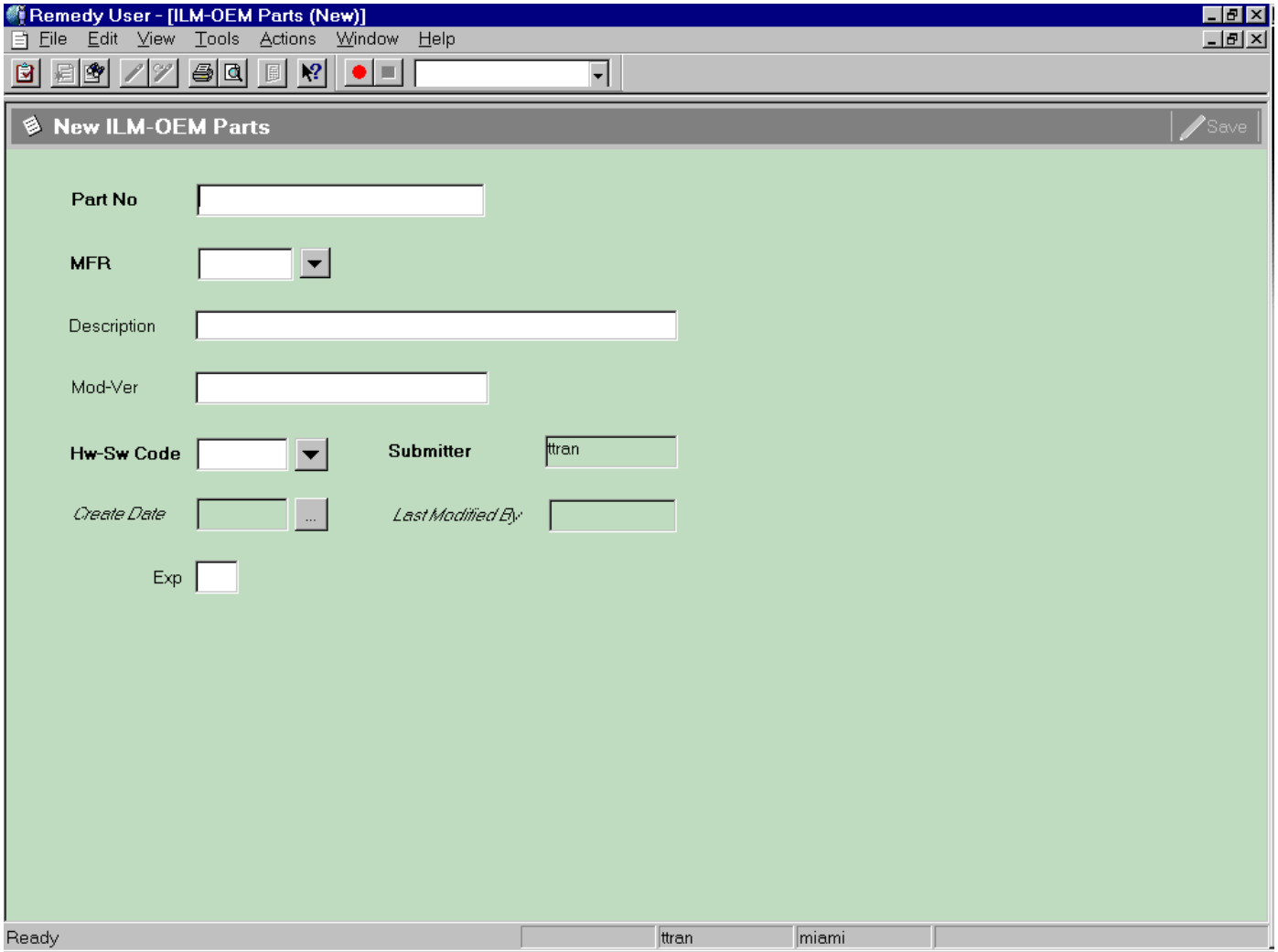
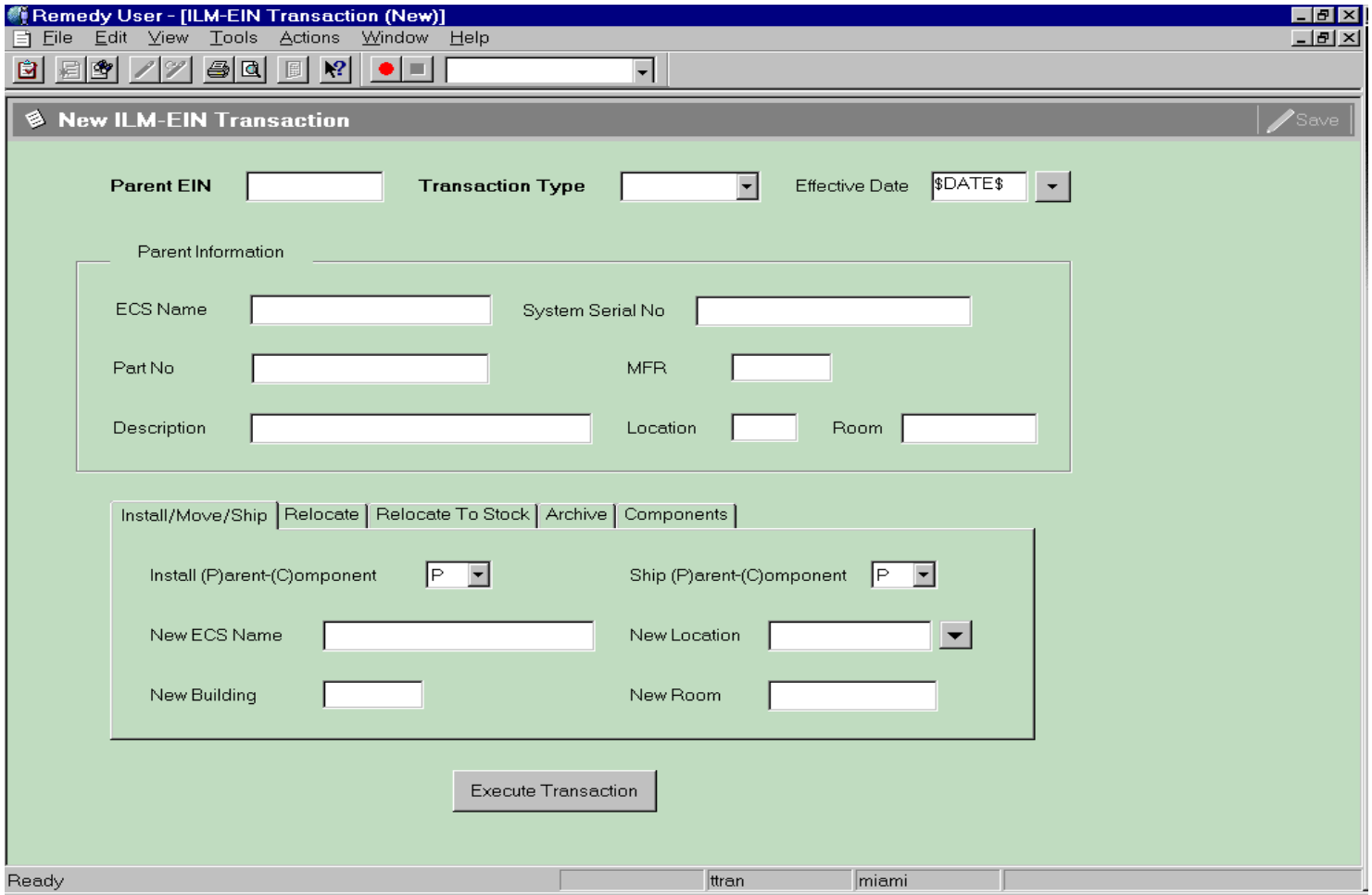
Remedy OPEN Dialog for ILM Access



New ILM-EIN Entry Form



ILM-OEM Parts Form



ILM-EIN Transaction Form